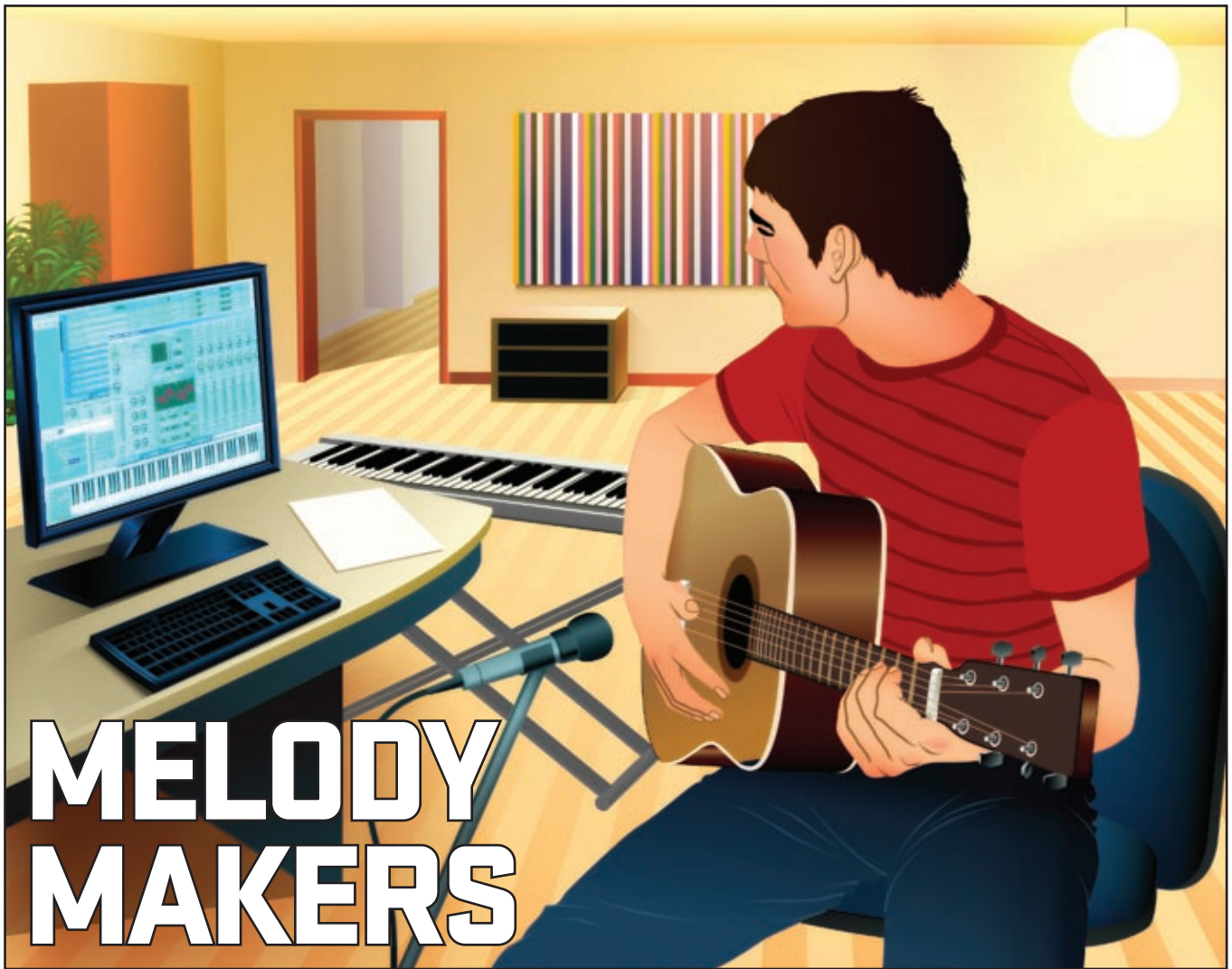




# MELODY MAKERS

All you need to set up your own recording studio is a PC, some inexpensive kit and a little inspiration. Ben Pitt explains how to turn your bedroom into the new Abbey Road

**M**usic production has experienced a radical transformation in *Computer Shopper's* lifetime. Twenty years ago, the Atari ST unlocked the door to a brave new world of computer-based home studio production. In 2007, the computer hardware and software found in home studios is often the same kit that's being used by some of the biggest names in the music industry.

So how much do you have to spend to get a studio setup that can make release-quality music? The answer depends on the style of music you want to record and the instruments you want to use. Studio equipment is more affordable than ever, but there are numerous hidden costs that can quickly mount up.

Everyone will have their own specific needs, but we have identified three typical musicians and put together the best budget-conscious package for each one. You might find that your requirements straddle more than one of the examples discussed here, so feel free to mix and match as necessary.

Whether you're planning on making glitchy techno, stadium rock or Balinese gamelan, we'll help you kit yourself out to record it to the highest standard without spending a fortune. In next month's issue, after you've had time to flex your credit card, we'll

follow it up with a feature on how to use your new recording studio.

## GET THE BASICS RIGHT

Our shopping lists assume that you already have a suitable PC. The latest generation of software typically requires Windows XP (with Vista support beginning to emerge), a 1.5GHz processor and 512MB of RAM. The more processing power and RAM you have, the more and higher quality effects and virtual instruments you'll be able to run.

The hard disk is another key component. Multitrack audio recording creates large files – a four-minute song comprising 24 tracks of audio will consume 1.5GB disk space, and more if you've recorded lots of alternative takes. Sample libraries and virtual instrument installations can consume many gigabytes of space, too. Hard disk performance can be an issue when streaming lots of simultaneous tracks and samples, so it's often a good idea to buy a separate hard disk just for audio recordings. Internal drives are fastest and cheapest. Samsung's 500GB Serial ATA drive (see *Labs*, *Shopper* July 2007) costs £71 including VAT.

## PC TO RECORDING STUDIO

There are four key ingredients for turning a normal PC into a recording studio: a sound card

or external audio interface, software, speakers and (optionally) microphones. Most PCs come with sound integrated into the motherboard, and although quality has come on in leaps and bounds in recent years, the types of connections they provide and the software drivers they use aren't ideal for music production. Most music applications work best with ASIO drivers, which are available for all the sound cards we've recommended in the case studies (all prices are taken from [www.turnkey.co.uk](http://www.turnkey.co.uk) and include VAT).

Previously, sound cards predominantly used the PCI interface. This interface is now being phased out, but few sound cards that use the newer interface – PCI Express – are currently available. Therefore, USB and FireWire audio interfaces are better bets. These have the added advantage of being easy to move between different PCs, and they often include hardware controls and displays, which are much easier to use than software utilities.

You'll also need music-production software. There are lots of fine examples, from free applications bundled with audio interfaces to professional suites costing hundreds of pounds; see our recommendations in the case studies.

Just as important is your choice of speakers. PC speakers are often fairly basic, and better ones are designed to flatter music rather than



## CREATE YOUR OWN RECORDING STUDIO

give an accurate reproduction of your recordings. Accuracy is paramount in speakers designed for music production. This means high clarity and low distortion so you can hear the details in your mixes, plus a flat frequency response so you're not compensating for your speakers' deficiencies when you come to mix.

Studio speakers, known as monitors, come in active designs – which include built-in amplification – and passive designs, which don't. You should therefore choose the former unless you have a high-quality amplifier going spare. The best sets cost tens of thousands of pounds, but prices start at around £100, and these sets will be more useful for music production than the average £100 PC speakers, even if they don't

sound quite as impressive. Spending £200 should get you something you won't grow out of in a hurry.

This may well turn out to be the most expensive part of your studio, but it's the area where larger investments give the greatest reward. If your budget simply won't stretch that far, you could always postpone buying monitors until a later date. One useful feature of PC music production is that it's very easy to go back and rework things, which you might want to do once you've upgraded your monitors.

If you plan to record acoustic instruments and overdub one instrument on top of another, you'll also need a pair of headphones. Otherwise, the sound from your speakers will

leak into the microphone while recording, making it harder to edit and mix. Headphones can also be useful for working at anti-social times, but it's tricky to produce accurate mixes using headphones, so they're not a substitute for decent monitors.

You probably have some headphones already, but the cable might be too short to position the performer a reasonable distance away from noisy PC fans. If you need to buy a set, you'll find a wide range in specialist music stores, with prices starting at around £20. Go for a closed-back design, which reduces sound leakage compared to open-backed designs.

## TAKING THE MIC

Microphones cost anything from £1 to £3,000 although, as with most technology, you start to see diminishing returns above a certain point. £30 microphones are serviceable, £100 models are generally excellent and £1,000 ones are even better, but not 10 times better.

You should avoid cheap microphones without an XLR output, as they won't benefit from a balanced output. We also recommend avoiding USB microphones. These have a built-in preamp and USB audio interface, which reduces costs but makes them tricky to integrate with larger recording setups. They're great for podcasting, but less useful for music production.

Microphones fall into two groups: dynamic and condenser. Dynamic mics are robust, making them ideal for stage use and recording very loud instruments such as drums. Shure's SM57 (£66) and SM58 (£68) are classic examples; the former is a popular choice for instruments, the latter for vocals. Other models from Shure and Sennheiser start at around £25.

However, for vocals, a condenser microphone is usually better, and it's the obvious choice for acoustic guitars, drum overheads (microphones positioned over the whole drum kit), pianos and other acoustic instruments. These mics give a richer, more detailed tone, particularly for quiet sounds. They require phantom power, which not all preamps offer. We recommend Rode's NT1A (£119), although Samson's C01 (£36) is a reasonable low-cost alternative.

There is a vast range of specialist microphones with physical designs and frequency responses that lend themselves to particular tasks, such as robust kick drum microphones with accentuated bass – AKG's D112 (£95) is the classic – or mics that clip on to wind instruments or drum rims.

When you're counting your pennies to see which microphones you can afford, don't forget

## Example 1 A shopping list for electronic music producers

Electronic music tends to be made up of samples (taken from records, sample libraries and found sounds) and synthesizers, with perhaps just the odd live vocal or other instrument laid over the top. It's possible to write synthesizer lines using a mouse, but even if your piano skills aren't up to much, it's much easier with a MIDI keyboard. We've chosen M-Audio's Ozone because it combines nearly everything electronic music producers need in a low-cost, compact package.

This two-octave keyboard has a built-in audio interface with ASIO drivers. There's an instrument-level input and XLR microphone input with phantom power. The preamp isn't up to the standards of the Tapco, PreSonus and Alesis audio interfaces mentioned elsewhere, but it is much better than motherboard-integrated microphone inputs. The knobs on the front panel make it easy to set levels, and can also send MIDI data to control synth settings.

The package also includes Live Lite 5, a cut-down version of Ableton's fantastic music-production software. Its limitations of four audio tracks, four MIDI tracks and just two effects per project are pretty stingy, but there's still plenty of fun to be had.

If you want more powerful software, the full version of Ableton Live 6 (*What's New, Shopper* February 2007) is an excellent choice, particularly for electronic music production. It costs £282, but registered Live Lite users can upgrade for €379 (about £264) at [www.ableton.com/upgrade](http://www.ableton.com/upgrade). Alternatively, see last month's *What's New* for reviews of



▲ M-Audio's Ozone handles both audio and MIDI via a single USB connection

the leading low-cost packages, Mackie Traction and Sonar Home Studio.

Bass is particularly important in most forms of electronic music, which is why we have blown a large part of the budget on monitor speakers. Cheaper monitors are available but these tend to be physically smaller, which means less volume and less deep bass. If your budget won't stretch to the Alesis M1 Active Mk2, you can always make do with your existing PC or hi-fi speakers for now and put them on your wish list. We have also included a low-cost microphone for recording live vocals, as you can get away with a lo-fi vocal sound more easily in dance music than in other genres.

One of the most exciting recent developments in PC audio is the proliferation of software synthesizers, or virtual instruments as they're often known. Most use the VST plug-in format, which means they will work inside any host software mentioned in this feature. Everything from telephone exchange-like modular synths to orchestral emulations to totally new synthesis techniques with no hardware equivalent are available as a VST plug-in.

Many of these synths take full advantage of the PC's large screen and generous RAM and hard disk space to achieve things that simply aren't possible in hardware synths. For example, Garritan Personal Orchestra (*What's New, Shopper* December 2006) uses 2½GB of samples to reproduce orchestral instruments with impressive authenticity. This trend for sample libraries being presented in a virtual instrument plug-in makes them quicker to work with than folders of Wav files.

Visit [www.timespace.com](http://www.timespace.com) for a range of commercial VST instrument plug-ins, or [www.free-plugin-list.com](http://www.free-plugin-list.com) for a massive array of weird and wonderful freebies.

| SHOPPING LIST                                                                    |             |
|----------------------------------------------------------------------------------|-------------|
| M-Audio Ozone<br>USB keyboard/ audio interface with Ableton Live Lite 5 software | £119        |
| Alesis M1 Active Mk2<br>Active studio monitors                                   | £208        |
| Shure PG48<br>Handheld mic with bundled XLR cable                                | £24         |
| 2x quarter-inch jack cables<br>To connect audio interface and monitor speakers   | £10         |
| <b>TOTAL</b>                                                                     | <b>£361</b> |



▲ Rode's NT1A microphone is an excellent choice for vocal recording, with a classy sound that belies its £119 price





◀ Microphone kits reduce the cost and complexity of buying mics for drum recording

to budget for stands and cables. Expect to pay at least £10 for each, and up to £30 each if you want them to last for a good few years. If you'll be recording vocals with a capacitor mic, you'll also need a pop shield – a fabric mesh that's placed between the singer and microphone to catch blasts of air caused by 'P' and 'B' sounds, which would otherwise distort the microphone.

### WIRING UP

Every PC owner is already used to having a different, mutually incompatible cable for every occasion. Music studios aren't much different, but the various signal and connector types have one thing in common: they all carry audio.

Audio connections fall into three groups: analogue, digital and data. Analogue signals are so called because the voltage in the cable is analogous to the changes in air pressure that constitute sound. In short, vibrations in the air

are represented by a vibrating voltage. An analogue cable carries a single (mono) signal heading in one direction, so two are required for a stereo signal (a headphone cable contains two independent signals on separate wires, one for each ear).

All analogue signals are pretty similar, which is why you could connect a CD player output to a guitar amp input, given the desire and the right cable. However, problems arise because different devices run at different voltages. The weakest is a microphone signal. A microphone is essentially a dynamo, turning moving air (sound) into electricity. It's not surprising it's a pretty weak signal, so weak in fact that the microphones are highly susceptible to interference, particularly from mains wiring.

The solution is delightfully simple and effective. Balanced microphones output two signals simultaneously; one carries the normal

analogue audio, while the other is essentially a mirror image (phase-inversed, to give it its proper name), mapping positive voltages to equal negative ones, and vice versa. When the two signals arrive at their destination, the phase-inversed one is flipped back the right way around and added to the original. This simultaneously strengthens the wanted signal and – by combining any interference with the inverse of the same interference – pretty much eliminates it.

This technique requires three wires: one for each signal and a shared ground. It's possible to identify a microphone with a so-called balanced output because it will have a three-pin XLR socket. Cheaper, unbalanced microphones use a jack or mini-jack output.

Balanced microphone signals are still too quiet to interface with most other studio equipment, so a microphone preamp is necessary to boost it to line-level – this is the level that is used by most audio equipment. Superior preamps provide phantom power, and this sends 48V back up the cable to power condenser microphones, which include active electronics.

A microphone preamp may seem like a pretty unexciting part of a studio, but it's just as important as the microphone in its influence on the quality of recordings.

Other types of analogue audio signals include instrument-level, which refers to the output from an electric guitar or other form of pickup. These signals are a little weaker than line level, and must be plugged into a high-impedance input to get a healthy signal. However, most of the time you'll get a better

### Example 2 A shopping list for singer-songwriters

This shopping list isn't just for singer-songwriters of the angst-ridden variety. We've aimed it at any musician that wants to capture their warbling, strumming and ivory-tinkling in all its glory.

Experienced piano players will feel constricted by the two-octave keyboard we recommend opposite, so here we've gone for the four-octave M-Audio Keystation 49e.

| SHOPPING LIST                                   |             |
|-------------------------------------------------|-------------|
| M-Audio Keystation 49e                          | £51         |
| Four-octave MIDI keyboard with USB interface    |             |
| Quik-Lok T-10                                   | £22         |
| Keyboard stand                                  |             |
| Cakewalk Studio Instruments                     | £30         |
| Drum, bass, piano and string VST plug-ins       |             |
| Tapco Link.USB                                  | £99         |
| USB audio interface with Tracktion 2 software   |             |
| 2x Samson C01                                   | £70         |
| Condenser microphones                           |             |
| 2x stands, XLR cables, pop shields              | £40         |
| Accessories for the microphones                 |             |
| Samson Resolv 40a                               | £80         |
| Compact active studio monitors                  |             |
| 2x quarter-inch jack cables                     | £10         |
| To connect audio interface and monitor speakers |             |
| <b>TOTAL</b>                                    | <b>£402</b> |

Models with five octaves and the full 88 notes are available in the same range for £108 and £144 respectively, while the Keystation Pro 88 has weighted, hammer-action keys and costs £283. Unlike a two-octave keyboard, these won't balance comfortably on your lap, so we've also included a keyboard stand.

These controller keyboards don't have any sounds built in and send MIDI data to the PC via their integrated USB interfaces, which keeps the cost down. You'll need sounds to come from somewhere, though, which is why we've included Cakewalk Studio Instruments (*What's New, Shopper* November 2007). This set of VST instruments covers all the essentials to fill out a simple vocal and guitar part into a full song. If you have no interest in keyboards, remove the keyboard, stand and software from your shopping list and save £103.

Tapco's Link.USB (*What's New, Shopper* April 2007) is an excellent audio interface with its efficient ASIO drivers, excellent audio quality, two microphone pre-amps with phantom power and a bundled copy of Mackie Tracktion 2. We reviewed version 3 of this excellent music-production software last month, and although the copy included here lacks the bundled extras, its friendly yet uncompromising approach is perfect for recording live performances.

Most acoustic instruments benefit tremendously from being recorded in stereo,



▲ The Tapco Link.USB includes top-quality hardware and software for solo performers

giving a richer, more spacious sound. The only exceptions are instruments whose sound emits from a single point, such as the voice and brass. We have therefore chosen a pair of microphones.

Samson's C01s are great-value condenser mics that are well suited to most tasks except for close-miking very loud instruments. However, the elastic suspension cradles to reduce rumbles travelling through the stand cost £25 extra – you may or may not find them a necessary additional expense. The Brenell Microphone Plus Pack available from [www.turnkey.co.uk](http://www.turnkey.co.uk) combines an XLR cable, mic stand and pop shield and costs just £20 each.

Because this sort of music isn't so reliant on deep bass, we have clawed back some of the budget by going for compact monitor speakers. However, we would still recommend Alesis' M1 Active Mk2 if your budget can stretch that far.



▲ The three-pin XLR connection used by professional microphones uses a 'balanced' signal that reduces interference

sound by putting a microphone in front of a guitar amp; after all, the amp is an intrinsic part of an electric guitar sound.

### DIGITAL DELIVERIES

Digital audio connections carry audio signals as a stream of ones and zeros rather than an oscillating voltage. An analogue-to-digital converter (ADC) samples the analogue signal thousands of times a second, converting each one into a digital measurement. A digital-to-analogue converter (DAC) does the opposite.

There is at least one stereo ADC and DAC built into almost every sound card, allowing

analogue audio to interface with the digital innards of a PC.

It's sometimes useful to move audio between other pieces of audio gear as a digital stream. If audio exists in digital form and you want it to get to another digital device, there's little point in converting it to analogue for the journey, only to convert it back to digital again on arrival. As with analogue connections, digital audio signals flow along a cable in only one direction – so it must go from an output to an input – but unlike analogue cables, a single digital audio cable can carry multiple signals.

Once again, there are different types of digital audio connections. S/PDIF is the most common, and carries a stereo (two-channel) signal at whatever sample rate you choose. S/PDIF is available in coaxial (electrical) and optical (fibre-optic) versions, and even though they carry exactly the same signal, they can't plug into one another. AES-EBU is another digital format that's pretty similar to coaxial S/PDIF, but is common only on high-end audio equipment. Yet another type is ADAT, which uses the same fibre-optic cables as optical S/PDIF, but carries eight channels of audio simultaneously. This is particularly useful for

connecting an eight-channel microphone preamp to an audio interface using a single fibre-optic cable.

Data connections will be familiar to PC users; they comprise USB and FireWire, plus the odd proprietary standard that home studio owners are unlikely to encounter. This connection is controlled by the audio interface's driver software and can contain any number of digital audio channels (or other data) going in or out, as long as it fits within the 50 to 60MB/s data rate of these interfaces.

### GO ON, DIVE IN!

Studio equipment can be a minefield of confusing standards, and it's often hard to separate the essential features from the marketing hyperbole. However, now that you've read this far, you're well equipped to make some excellent choices. Music production can be an expensive hobby because there is so much fantastic equipment available to push your recordings in new directions. However, the recommendations we've made in this feature are for equipment that won't become redundant as your experience and expectations grow.

We'll give you a month to take us up on our advice. In the next issue, we'll follow this up with a beginner's guide to PC music production. Once again, this can feel like a daunting mountain to climb, but with our help you'll be on the fast track to musical bliss. **CS**

### Example 3 A shopping list for bands and ensembles

For recording more than one instrument at the same time or for doing justice to a drum kit, you'll need lots of microphones plus the same number of cables, preamps and inputs on your audio interface. Fortunately, there are packages tailored for exactly this task.

The Alesis iO26 is an audio interface with eight microphone preamps that record simultaneously to eight tracks in the bundled Cubase LE software. Like nearly all such devices, it connects to the PC via FireWire. If your PC doesn't have FireWire ports, you can add them with a PCI or PCI Express card, available from computer retailers for around £10. Cubase LE is a no-nonsense, high-

quality recording program, although its 48-track and two-effects-per-track limitations mean ambitious users might want to replace it: we recommend Mackie Tracktion 3 Project Bundle (see *What's New, Shopper* November 2007).

Samson's 7 Drum Mic Kit is a collection of microphones specifically designed for recording a drum kit, with one kick (bass) drum, one snare, three tom and two overhead microphones. The snare and tom mics clip directly on the drums, so you won't need stands for them. If you have only two tom drums, use the spare microphone to record the underside of the snare, which sounds quite different to the top. The only thing missing from this kit is a hi-hat microphone, for which we have splashed out on a Rode NT1A. This isn't so much because the hi-hat is so important, but more because the NT1A can double as a vocal microphone.

If you want to record more than eight microphones at once, perhaps to record an entire band playing together, get another eight-channel microphone preamp with an ADAT digital output; Behringer's ADA8000 (£156) is an excellent low-cost example. The Alesis iO26 has two ADAT inputs so can accommodate two ADA8000s for a total of 24 simultaneous inputs. If you do so, be sure to lock the iO26's clock to its ADAT input (available from its software control panel), and synchronise the two preamps together using a BNC cable. This avoids nasty distortions caused by each device's digital clock drifting out of time with the others. You'll definitely need to upgrade the software because Cubase LE only handles up to eight inputs. Don't forget



▲ Alesis's iO26 (top) is perfect for band recording, while the PreSonus FP10 (bottom) can't be expanded as easily as the Alesis but is better for sound quality

that you'll have to budget for lots more microphones, stands and cables, too.

You might be tempted to use more than eight microphones to record a large acoustic ensemble such as a big band or orchestra. However, this can be overkill; there's often no need to put a separate microphone on each instrument. In fact, excellent orchestral recordings are possible with just two microphones. This is because orchestral recordings aim to re-create the listening experience of an audience member, rather than produce a synthetic or hyperreal multitrack recording, as is the case with most pop music.

If you decide that eight microphone inputs are enough, replace the Alesis iO26 with a PreSonus FP10 (£284), formerly known as the PreSonus FirePod. Like the iO26, it's a FireWire interface with eight microphone preamps and comes with Cubase LE. It lacks ADAT inputs, although multiple FP10s can be daisy-chained. However, its preamps are even better than the iO26's, with superb clarity and a rock-solid bottom end.

| SHOPPING LIST                                                                  |             |
|--------------------------------------------------------------------------------|-------------|
| Alesis iO26<br>Firewire audio interface with Cubase LE software                | £269        |
| Samson 7 Drum Mic Kit<br>Seven microphones for recording drums                 | £180        |
| Rode NT1A<br>Condenser microphone with cradle and pop shield                   | £119        |
| 4x Mic stands<br>Stands for the microphones that need them                     | £40         |
| 8x XLR cables<br>Mixture of 3m and 6m microphone cables                        | £100        |
| Alesis M1 Active Mk2<br>Active studio monitors                                 | £208        |
| 2x quarter-inch jack cables<br>To connect audio interface and monitor speakers | £10         |
| <b>TOTAL</b>                                                                   | <b>£926</b> |